UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF
PREVENTION,
PESTICIDES
AND TOXIC
SUBSTANCES

November 27, 2007

MEMORANDUM

Subject: Efficacy Review for EPA Reg. No. 65402-1, VigorOx Liquid Sanitizer and Disinfectant; DP Barcode: 344258

From: Tajah L. Blackburn, Ph.D., Microbiologist
Efficacy Evaluation Team 11/27/07
Product Science Branch
Antimicrobials Division (7510P)

Thru: Michele Wingfield, Chief
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To: Marshall Swindell PM 33/Karen Leavy
Regulatory Management Branch I
Antimicrobials Division (7510P)

Applicant: FMC Corporation
Peroxygens Division
1735 Market Street
Philadelphia, PA 19103

Formulations from Label

Active Ingredient(s)	% by wt.
Peroxyacetic Acid	5.1%
Hydrogen Peroxide	21.7%
Other Ingredients	73.2%
Total	100.0%

I BACKGROUND

The product, VigorOx Liquid Sanitizer and Disinfectant (EPA Reg. No. 65402-1), is a registered sanitizer and disinfectant for use on hard, non-porous surfaces in hospitals, health care facilities, schools, colleges, livestock premises, animal housing facilities, bathroom premises, food production areas, dairies, egg production, and eating establishments. In the current data package, the applicant requests (1) to add reference for a new foaming adjuvant to be used with the pesticide product, and (2) to add claims for efficacy against Avian Influenza (H5N1). The applicant requests to revise "directions for use to reinstate a reference to the foaming agent HRS I. The adjuvants, HRS I and HRS II, are two variants of a proprietary mixture developed by FMC. HRS I and HRS II have both previously been listed on the label as the only adjuvants to be used with VigorOx Liquid Sanitizer and Disinfectant. FMC wishes to list both adjuvants on the label concurrently, whereas currently HRS II is listed (applicant letter dated September 6, 2007)." The efficacy study was conducted at ATS Labs, located at 1285 Corporate Center, Suite 110, Eagan, MN 55121.

The data packaged contained a letter from the applicant (dated September 6, 2007), three email correspondences, one efficacy study (MRID No. 472282-01), and the proposed label.

Note: The email correspondences (between Matthew Talley and Dr. Blackburn) agreed to acceptance of the change in adjuvant in the absence of confirmatory data.

II USE DIRECTIONS

The product is designed for use in disinfecting and sanitizing hard, non-porous, non-food contact/food-contact surfaces such as floors, walls, ceilings, drains, bathroom fixtures, shelves, racks, coolers, tiles located in schools, food processing facilities, hospitals, zoos, and pet animal quarters. Directions on the proposed label provided the following information regarding the use of the product as a disinfectant and sanitizer:

> Disinfectant/Virucide: Prepare by adding 2• fluid ounce to 5 gallon of potable water (Equivalent to 230 ppm peroxyacetic acid and 990 ppm hydrogen peroxide). Remove gross filth from surfaces to be disinfected. Apply diluted product by wiping. Mopping, or as a coarse spray. Allow to soak for at least 5 minutes, then air dry.
>
> New Foam Sanitizer Directions: Prepare by adding 1 to 1.7 fluid ounces per 4.5 gallons potable water. Add 1 to 10 fluid ounces of HRS or add 2 to 20 fluid ounces of HRS II per 4.5 gallons of diluted solution. After the HRS it HRS II is added, adjust the total solution volume to 5 gallons.

II AGENCY STANDARDS FOR PROPOSED CLAIMS

Virucides

The effectiveness of virucides against specific viruses must be supported by efficacy data that simulates, to the extent possible in the laboratory, the conditions under which the product is intended to be used. Carrier methods that are modifications of

either the AOAC Use-Dilution Method (for liquid disinfectants) or the AOAC Germicidal Spray Products as Disinfectants Method (for spray disinfectants) must be used. To simulate in-use conditions, the specific virus to be treated must be inoculated onto hard surfaces, allowed to dry, and then treated with the product according to the directions for use on the product label. One surface for each of 2 different product lots of disinfectant must be tested against a recoverable virus titer of at least 10^4 from the test surface for a specified exposure period at room temperature. Then, the virus must be assayed by an appropriate virological technique, using a minimum of four determinations per each dilution assayed. Separate studies are required for each virus. The calculated viral titers must be reported with the test results. For the data to be considered acceptable, results must demonstrate complete inactivation of the virus at all dilutions. When cytotoxicity is evident, at least a 3-log reduction in titer must be demonstrated beyond the cytotoxic level. These Agency standards are presented in DIS/TSS-7.

Sanitizing Rinses (For Previously Cleaned, Food Contact Surfaces)

Sanitizing rinses may be formulated with quaternary ammonium compounds, chlorinated trisodium phosphate, or anionic detergent-acid formulations. The effectiveness of such sanitizing rinses for previously cleaned, food contact surfaces must be substantiated by data derived from the AOAC Germicidal and Detergent Sanitizing Action of Disinfectants Method. Data from the test on 1 sample from each of 3 different product lots, one of which is at least 60 days old against *Escherichia coli* (ATCC 11229) and *Staphylococcus aureus* (ATCC 6538) are required. When the effectiveness of the product in hard water is made, all required data must be developed at the hard water tolerance claimed. Acceptable results must demonstrate a 99.999% reduction in the number of microorganisms within 30 seconds. The results must be reported according to the actual count and the percentage reduction over the control. Furthermore, counts on the number controls for the product should fall between 75 and 125 x 10^6/mL for percent reductions to be considered valid. Label directions for use must state that a contact time of at least 1 minute is required for sanitization. A potable water rinse is not required (to remove the use solution for the treated surface) for products cleared for use on food contact surfaces under the Federal Food, Drug, and Cosmetic Act. Label directions must recommend a potable water rinse (to remove the use solution from the treated surface) under any other circumstances. These Agency standards are presented in DIS/TSS-4 and -17, as well as the AOAC Germicidal and Detergent Sanitizing Action of Disinfectants Method.

Supplemental Claims

An antimicrobial agent identified as a "one-step" disinfectant or as effective in the presence of organic soil must be tested for efficacy with an appropriate organic soil load, such as 5 percent serum. These Agency standards are presented in DIS/TSS-2. On a product label, the hard water tolerance level may differ with the level of antimicrobial activity (e.g., sanitizer vs. disinfectant) claimed. To establish efficacy in hard water, all microorganisms (i.e., bacteria, fungi, viruses) claimed to be controlled must be tested by the appropriate Recommended Method at the same hard water tolerance level. These Agency standards are also presented in DIS/TSS-2.

IV SYNOPSIS OF SUBMITTED EFFICACY STUDY

1. MRID 469073-01 "Virucidal Efficacy of a Disinfectant for Use on Inanimate Environmental Surfaces, Virus: Avian Influenza virus (H5N1)" for VigorOx Liquid Sanitizer and Disinfectant, by Kelleen Gutzmann. Study conducted at ATS Labs. Study completion date – August 21, 2007. Project Number A05240.

This study was conducted against **Avian Influenza virus (H5N1)** virus (Strain VNH5N1-PR8/CDC-RG/ CDC#2006719965) using cultures of Rhesus monkey kidney cells (RMK cells; obtained from ViroMed Laboratories Inc.) as the host system. Two lots (Lot Nos. 70604 81 0000805061 and 70214 10 0000781328) of the product, VigorOx Liquid Sanitizer and Disinfectant, were tested according to ATS Labs Protocol No. FMC04061307.AFLU (copy provided). A use solution was prepared by adding 1.0 ml of the product to 229.0 ml of 500 ppm AOAC synthetic hard water (titrated at 505 ppm; 230 ppm PAA). The stock virus culture was adjusted to contain 5% fetal bovine serum as the organic soil load. Films of virus were prepared by spreading 0.2 ml of virus inoculum uniformly over the bottoms of separate sterile glass Petri dishes. The virus films were air-dried for 20 minutes at 23.0°C. For each lot of product, separate dried virus films were exposed to 2.0 ml of the use solution for 5 minutes at 20.0°C. After the contact period, the plates were scraped with a cell scraper to re-suspend the contents. The virus-disinfectant mixtures were passed through individual Sephadex columns, and diluted serially in Minimum Essential Medium supplemented with 1% heat-inactivated fetal bovine serum, 10 µg/ml gentamicin, 100 units/ml penicillin, and 2.5 µg/ml amphotericin B. RMK cells in multi-well culture dishes were inoculated in quadruplicate with 0.1 ml of the dilutions. The cultures were incubated at 36-38°C in a humidified atmosphere of 5-7% CO_2 and scored periodically for 7 days for the presence or absence of unspecified cytopathic effects, cytotoxicity, and viability. Controls included those for dried virus count, cytotoxicity, and neutralization. Viral and cytotoxicity titers were calculated by the method of Spearman Karber.

V RESULTS

MRID Number	Organism	Results			Dried Virus Control
			Lot No. 666952	Lot No. 679125	
472282-01	Avian Influenza (H5N1)	10^{-1} to 10^{-7} dilutions	Complete inactivation	Complete inactivation	$10^{5.0}$ $TCID_{50}$/0.1ml
		$TCID_{50}$/0.1 ml	$\leq 10^{0.5}$	$\leq 10^{0.5}$	

VI CONCLUSIONS

The submitted efficacy data support the use of a 230 PPA use solution of the product, VigorOx Liquid Sanitizer and Disinfectant, as a disinfectant with virucidal activity against Avian Influenza (H5N1) on hard, non-porous surfaces in the presence of 500 ppm hard water and a 5% organic soil load for a contact time of 5 minutes. Recoverable virus titers of at least 10^4 were achieved. Cytotoxicity was not observed. Complete inactivation (no growth) was indicated in all dilutions tested.

VII RECOMMENDATIONS

1. The proposed label claims are acceptable regarding the use of VigorOx Liquid Sanitizer and Disinfectant as a disinfectant with virucidal claims against Avian Influenza (H5N1) when prepared by adding 1.0 ml of the product to 229.0 ml of 500 ppm AOAC synthetic hard water (titrated at 505 ppm; 230 ppm PAA) for a contact time of 5 minutes in the presence of 5% organic soil load. Submitted efficacy data support these claims.

2. The following corrections are required on the proposed label:

- Remove "asphalt" from the proposed label, as this is a porous surfaces;
- Included "glazed" as a descriptor for both "tile" and "porcelain" surfaces;
- Change "survaces" to "surfaces";
- Include "up to 500 ppm" for claims of hard water;
- Change "*Salmonella choleraesuis*" to "*Salmonella enterica*";
- Change "Rhinitrachitis" to "Rhinotracheitis"

3. The verbiage provided as a revision (i.e., "directions for use to reinstate a reference to the foaming agent HRS I. The adjuvants, HRS I and HRS II, are two variants of a proprietary mixture developed by FMC. HRS I and HRS II have both previously been listed on the label as the only adjuvants to be used with VigorOx Liquid Sanitizer and Disinfectant. FMC wishes to list both adjuvants on the label concurrently, whereas currently HRS II is listed (applicant letter dated September 6, 2007))", was accepted on the last label dated August 8, 2007.